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A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME

TECHNICAL FIELD

The present invention relates to a warp knit having excellent touch and a process of preparing such a warp knit.

More particularly, the present invention relates to a warp knit with softness and draping property due to its very fine structure and thus useful for materials of artificial leathers or ladies' clothes, and a process of preparing such a warp knit.

BACKGROUND ART

If a fiber becomes fined, its bending strength becomes weakened. Accordingly, since fabrics produced with ultra fine fiber have very soft touch, researches in connection with producing such ultra fine fiber on a commercial scale are developing very actively. Also, development of the technology which is capable of producing synthetic yarn extremely finely leads to great improvement of the value of the goods of sensitive materials for clothes.

Generally, a process of preparing ultra fine fiber is divided into

three processes: a direct spinning process; a two components division type spinning process; and a two components extraction type spinning process. In the direct spinning process, it is possible to prepare ultra fine fiber of 0.3~0.5 denier. In the two components division type spinning process, it is possible to prepare ultra fine fiber of 0.2 denier. In the two components extraction type spinning process, it is possible to prepare ultra fine fiber of 0.01 denier or below.

In case that the ultra fine fiber prepared by means of the direct spinning process is applied to a warp knit, warping property and appearance of the warp knit is very poor since numerous filaments are scattered. Furthermore, the warp knit thus prepared is very inferior in touch and writing effect.

In case that the ultra fine fiber prepared by means of the two components division type composite spinning process consisting of nylon/polyester is applied to a warp knit, warping property and knitting property of the warp knit is very poor since the nylon is isolated from the polyester by means of the tension and friction in warping and knitting. Furthermore, appearance of the prepared product is very poor due to limit of the denier of the ultra fine fiber.

In case that the composite fiber of 0.05 denier or below prepared by

means of the two components extraction type spinning process is applied to a warp knit, warping property, knitting property and touch of the warp knit are good; however, density in the structure of the warp knit is loosened and thus appearance of the warp knit is poor since the extraction component is extracted at the following processing step for producing in ultra fine fiber.

Producing goods with ultra fine fiber are developing in variety in connection with textile applications. However, producing goods with ultra fine fiber are not developing connection with knitting applications since the poor warping property and the several drawbacks generated at the following processing step as mentioned above.

Accordingly, it is an object of the present invention to prepare a warp knit, which has excellent touch, shape stability, and appearance, and thus is suitable for materials of ladies' clothes, with good warping property and knitting property.

DISCLOSURE OF THE INVENTION

The present invention provides a warp knit which has excellent touch, shape stability, flexibility, and appearance, and thus is suitable for materials of ladies' clothes. The present invention also provides a process

of preparing such a warp knit with good warping property and knitting property.

More particularly, the present invention relates to a warp knit having excellent touch, consist of a front surface layer and a rear surface layer, the front surface layer consisting of ultra fine yarn with mono-filament denier of 0.01~0.9 denier, the rear surface layer consisting of synthetic yarn or high shrinkage yarn with mono-filament denier of 1~5 denier, wherein the recovery rate of elongation in the directions of wale and course is 8~30 %.

The present invention also relates to a process of preparing a warp knit having excellent touch, characterized in that knitting a warp knit by using a composite fiber consisting of a fiber formation component of 0.01~0.9 denier and a extraction component as a yarn of a front surface layer, and a synthetic yarn or high shrinkage yarn with mono-filament of 1~5 denier as a yarn of a rear surface layer, and then raising the warp knit until the shrinkage rate of the warp knit is reached 40% or more, and then preliminarily heating, extracting the extraction component from the composite fiber, dyeing, buffing, and finally heating the warp knit continuously.

The present invention will now be described in more detail.

The inventor of the present application accomplished the present invention, taking notice of the fact that the selection and the combination of the materials in designing structure is very important in order to prepare polyester warp knit which is as soft as natural suede and which has excellent appearance as well as excellent warping property and knitting property.

Fist of all, the present invention uses a composite fiber consisting of fiber formation components of 0.01~0.9 denier and extraction component as a yarn of the front surface layer. If the extraction component is removed from the composite fiber, the fiber formation component with mono-filament denier of 0.01~0.9 denier is only remained. If the mono-filament denier of the yarn at the front surface layer is more than 0.9 denier, its soft touch is poor and the writing effect is not revealed. If the mono-filament denier of the yarn at the front surface layer is less than 0.01 denier, its soft touch is maintained, but its appearance is poor since the raised fiber are omitted or entangled due to friction.

It is preferable that the density of the yarn at the front surface layer is increased in order to improve the touch of the warp knit. It is possible for increasing the density of the yarn at the front surface layer to reduce the content of extraction component in the composite fiber during the manufacturing stage ; however, it is curbed technically in spinning process,

and there are limitations in increasing the density thereof even if the content of the extraction component in the composite fiber is reduced.

The content of the extraction component in the composite fiber is generally 20~40 % in weight.

Accordingly, it is more preferable for increasing the density of fiber at the front surface layer to use high shrinkage yarn as a yarn of the rear surface layer.

It is preferable that polyester is used as the fiber formation component and copolyester with excellent alkali hydrolysis property is used as the extraction component of the composite fiber used as yarn of the front surface layer.

Next, synthetic yarn or high shrinkage yarn with mono-filament denier of 1~5 denier are used as the yarn of the rear surface layer. If the mono-filament denier of the yarn at the rear surface layer is less than 1 denier, draping property of the warp knit is decreased. If the mono-filament denier of the yarn at the rear surface layer is more than 5 denier, warping property and knitting property of the warp knit are deteriorated.

The high shrinkage yarn, which are used as the yarn of the rear surface layer, preferably have the shrinkage rate of boiling water of

15~50 % and the stress of the heat shrinkage of 0.2 g/d or more. If the shrinkage rate of boiling water is less than 15 %, it is not possible to increase the density of ultra fine yarn, which are the yarn of the front surface layer, and thus the touch is poor since the shrinkage is extremely low. If the shrinkage rate of boiling water is more than 50 %, it is possible to increase the density of ultra fine yarn, which are the yarn of the front surface layer; however, it is hard to control the process width of the finished warp knit since the shrinkage is extremely high. Furthermore, if the stress of the heat shrinkage is less than 0.2 g/d, the stress between the structural points is not overcome even if the shrinkage rate of boiling water is high, and therefore sufficient shrinkage is not provided.

Copolyester is preferably used as the high shrinkage yarn as mentioned above. Co-polymer components include bisphenol-A, polyethyleneglycol, isophthalic acid or the like. However, the present invention is not limited to the co-polymer components as described above.

Also, the present invention use a synthetic yarn with mono-filament denier of 1~5 denier as a yarn of the rear surface layer. The synthetic yarn is polyester filament or polyamide filament, more preferable polyester filament. If the mono-filament denier of the yarn at the rear surface layer is less than 1 denier, it is impossible to add proper repulsion

to warp knit. If the mono-filament denier of the yarn at the rear surface layer is more than 5 denier, the process of warping and knitting are difficult, and touch of warp knit are deteriorated because repulsion of warp knit is increased too much.

The content of yarn of the rear surface layer when it is knitted is preferably 15~60 % in weight of the total weight of the processed warp knit. If the content of the yarn at the rear surface layer is less than 15% in weight, draping property is deteriorated. If the content of the yarn at the rear surface layer more than 60% in weight, the touch is deteriorated.

The content of the yarn of the front surface layer when it is knitted is preferably 40~85 % in weight of the total weight of the processed warp knit. If the content of the yarn of the front surface layer is less than 40 % in weight, the touch of the warp knit is poor. If the content of the yarn of the front surface layer is more than 85 % in weight, the draping property and the mechanical property of the warp knit is deteriorated.

The present invention is characterized in that such a raw warp knit as mentioned above is raised so that the shrinkage rate of the raw warp knit is 40 % or more before preliminary heat treatment of the raw warp knit. After the raw warp knit is raised according to the present invention, it is preliminarily heat-treated as usual, and it is treated in alkali solution,

thereby the extraction component is removed from the composite fiber. After that, the warp knit is dyed, buffered and finally heat-treated.

As the present invention use the extraction typed composit fiber as the yarn of the front surface layer, the warping and knitting property is excellent. And as the extraction component of composit fiber is extracted in after-process, the yarn of the front surface layer is fined. As result, the warp knit of the present invention has excellent touch and writing effect.

Meanwhile the warp knit of the present invention is composed densely out of ultra fine yarn with mono-filament denier of 0.01~0.9 denier, whereby its touch and appearance are very excellent. Especially, as the warp knit of the present invention includes the rear surface layer consisting of high shrinkage yarn with 15~50% of shrinkage rate of boiling water, the density of the ultra fine yarn at the front surface layer is higher, and recovery rate of elongation of a warp knit in the directions of the wale and the course is 8~30 %, which represents excellence. Also, as the warp knit of the present invention includes 15~60% in weight of the rear surface layer consisting of the high shrinkage yarn, the touch and the draping property of the warp knit are excellent.

Also, the warp knit of the present invention , used the synthetic yarn

with proper denier as the yarn of the rear surface layer, can solve the problem that the touch of warp knit prepared by two component extraction fiber is soft too much. And the above mentioned warp knit has excellent draping property and raising property.

As described in detail above, the warp knit of the present invention has excellent touch, appearance, and draping property, and thus it is suitable for materials of ladies' clothes or materials of artificial leathers.

The properties of the warp knit according to the present invention are evaluated as follows:

Softness

Softness of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit is soft, it is excellent. If five~seven specialists determine that the warp knit is soft, it is ordinary. If more than eight specialists determine that the warp knit is not soft, it is poor.

Draping property

Draping property of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has draping property, it is excellent. If five~seven specialists determine that the warp knit has draping property, it is ordinary.

If more than eight specialists determine that the warp knit has poor draping property, it is poor.

Writing effect

Writing effect of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has writing effect, it is excellent. If five~seven specialists determine that the warp knit has writing effect, it is ordinary. If more than eight specialists determine that the warp knit has poor writing effect, it is poor.

Appearance

Appearance of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has good appearance, it is excellent. If five~seven specialists determine that the warp knit has good appearance, it is ordinary. If more than eight specialists determine that the warp knit has poor appearance, it is poor.

Shrinkage rate of boiling water

Shrinkage rate of boiling water is measured according to JIS-L-1073 methods.

Recovery rate of elongation (%)

Total measurement is carried out according to KSK 08125, but proper elongation length when being elongated at the constant velocity is output by using JIS L 1096. Both ends of a sample of the warp knit with length of 10 cm and width of 15 cm are fixed to Instron. The warp knit is elongated constantly at the stretching velocity of 100 mm/min until the load of 750 g is reached. The warp knit is left as it is with the load being removed. Next, the warp knit is elongated at the constant velocity up to the original position. And then, the warp knit is left as it is for three minutes with the load being removed. The above process is repeatedly carried out five times. Finally, the elongated length L and the free elongated length L_1 are measured. The free elongated length L_1 is obtained by subtraction of the length measured after the warp knit is left as it is from the elongated length L (See Fig. 1). The recovery rate of elongation is obtained by putting the elongated length (L) and the free elongated length (L_1) in the following equation:

recovery rate of elongation (%) = [elongated length (L) - free elongated length (L_1)]/elongated length (L) $\times$ 100

Warping property

Warping property is evaluated by checking the stop times/hour of warping machine due to yarn defect. If the stop times/hour is naught, it is

excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of warping machine is calculated by dividing the total stop times of warping machine in warping the yarn of 9kg into total warping time.

Knitting property

Knitting property is evaluated by checking the stop times/hour of knitting machine due to yarn defect. If the stop times/hour is naught, it is excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of knitting machine is calculated by dividing the total stop times of knitting machine in a day into 24hour.

Raising property

Raising property of warp knit is evaluated from the sensitive examination. If the raising of warp knit is finished well by passing the raising machine 8 times at speed of 15m/minute, it is excellent. If the raising of warp knit is finished well by passing the raising machine 10 times at speed of 15m/minute, it is ordinary. If the raising of warp knit is finished well by passing the raising machine more then 10 times at speed of 15m/minute, it is poor.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a graph showing recovery rate of elongation of a warp knit measured using an Instron in accordance with the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The present invention is now understood more concretely by comparison between examples of the present invention and comparative examples. However, the present invention is not limited to such examples.

Example 1

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 5 denier and shrinkage rate of

boiling water of 28%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

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Example 2

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.07 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using

copolyester yarn with mono filament of 3 denier and shrinkage rate of boiling water of 34%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 31% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 55%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

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Example 3

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.04 denier of ultra fine yarn after removing the

extraction component, as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 2.5 denier and shrinkage rate of boiling water of 28%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 55% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Example 4

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and

which is prepared 0.2 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 5 denier and shrinkage rate of boiling water of 28%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 55%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

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Comparative Example 1

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester

copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 0.5 denier and shrinkage rate of boiling water of 40%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 48% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative Example 2

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is

polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 20 denier as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

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Comparative Example 3

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is

polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 1.3 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 20 denier as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative Example 4

Except using the ultra fine polyester yarn with mono filament of 0.04 denier, made by direct spinning, as the yarn of the front surface layer,

prepare a warp knit by same process and condition as example 1. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Table 1: Results of property evaluation of warp knit

Class		Example				Comparative example			
		1	2	3	4	1	2	3	4
Softeness		E	E	E	E	O	P	P	E
Draping property		E	E	E	O	P	E	O	O
Writing effect		E	E	E	E	E	P	P	P
Appearance		E	E	O	O	O	O	P	O
Warping property		E	E	E	E	E	E	O	P
Knitting property		E	E	E	E	O	E	E	P
Raising property		O	O	O	E	O	O	P	P
Recovery rate of elongation (%)	In the direction of wale	20.01	12.36	18.00	16.27	19.77	10.40	14.88	7.87
	In the direction of course	18.57	13.00	15.23	15.33	17.23	13.26	16.29	6.90

(The E means excellent, O means ordinary and P means poor in the table 1)

INDUSTRIAL APPLICABILITY

As described above, the warp knit according to the present invention has excellent touch, appearance, shape stability rate, draping property, and thus is useful for materials of artificial leathers or ladies' clothes. Furthermore, the process of preparing such a warp knit according to the present invention has very excellent warping property and knitting property.